SOUTH PARK BRIDGE PROJECT
Draft Environmental Impact Statement and Section 4(f) Evaluation

EXECUTIVE SUMMARY

September 2005

U.S. Department of Transportation
Federal Highway Administration

Washington State
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King County
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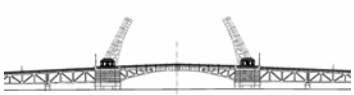

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Summary

S.1 Overview

King County proposes to rehabilitate or replace the existing South Park Bridge. This 74-year-old bridge is located in an industrial area south of downtown Seattle, Washington. It spans the Duwamish Waterway, which is the dredged portion of the river used by large commercial vessels. It links primarily industrial land uses on the north to the residential South Park community south of the waterway. The Boeing Company has manufacturing plants located to either side of 16th Avenue S. north of the Duwamish Waterway. In contrast, South Park is known as a diversified community with large Hispanic/Latino and Asian populations. The bridge is a critical link in the regional transportation system and is a direct route for residents of the South Park community to travel north to Seattle and east to I-5. Figure S-1 is a map of the project vicinity and major roadways of the area's transportation network.

The engineering design of the South Park Bridge is special. It is a double-leaf bascule bridge, or "drawbridge" (see Figure S-2). This particular bascule bridge design is called a Scherzer rolling-lift bridge because the two sides of the bridge open in a rolling motion allowing the bridge to rise vertically, while simultaneously rolling away from the waterway. In contrast, the typical drawbridge opens on simple "hinges." Figure S-3 is a schematic drawing of the central portion of the South Park Bridge in both the open and closed positions. Because the bridge is the only operational example of a Scherzer rolling-lift bridge in Washington, the 74-year-old bridge is listed on the National Register of Historic Places, the Washington Heritage Register, and the King County Landmark Register. The bridge currently has two northbound and two southbound lanes and sidewalks on both sides.

Developing alternatives to rehabilitate or replace the South Park Bridge has not been easy for the following reasons:

- The South Park community initially voiced a preference to repair the existing bridge. The poor condition of the bridge, though, would need substantial re-construction that could require bridge closure for more than two years.

- The community is very concerned about the nature and duration of construction impacts, including closure of the existing bridge and how that may affect businesses on 14th Avenue S.

- The Duwamish Waterway is a navigation channel used by commercial vessels, barges, tugs, as well as recreational boats. A major luxury boat builder is also located upstream of the bridge. Proposed bridge alternatives would need to have sufficient vertical clearance to allow this marine traffic to continue to travel upstream and downstream of the bridge.

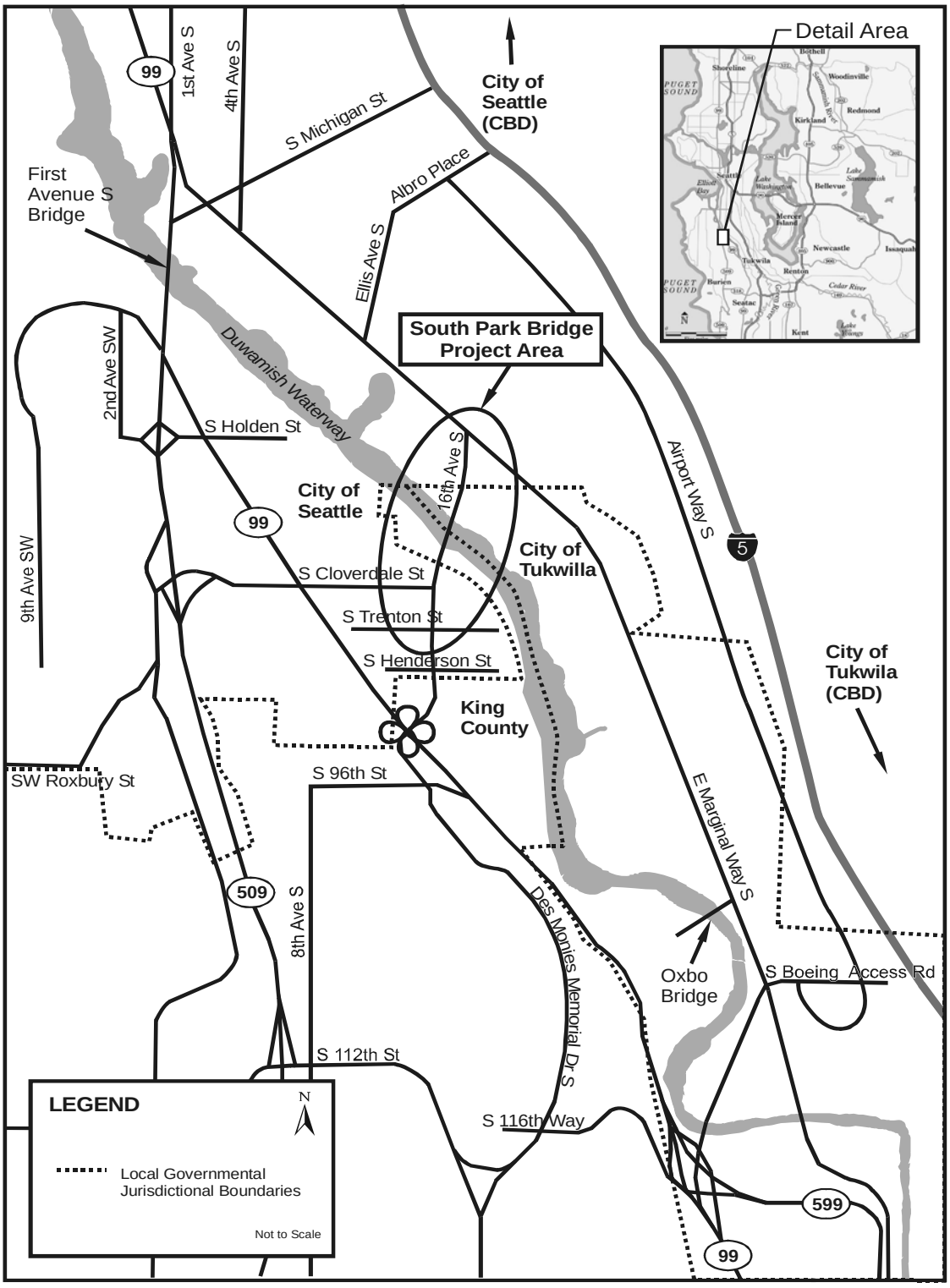

Figure S-1
Vicinity Map

Figure S-2
South Park Bridge

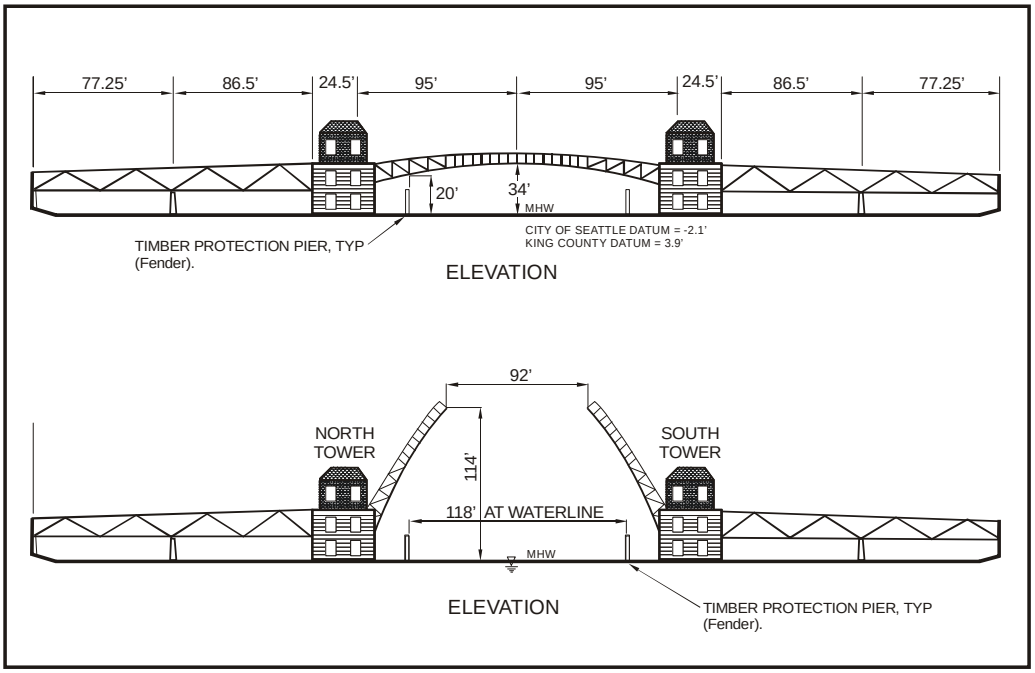

Figure S-3
South Park Bridge Navigation Clearances

- Design of a fixed-span bridge to accommodate large-sized vessels would require construction of a very high and long bridge that would affect property on 14th Avenue S. A lower-level bridge would restrict the vertical clearance for some existing marine vessel use and would impact marine-dependent businesses located upstream of the bridge. A fixed-span bridge could also limit future development of marine-dependent businesses on properties along the navigable waterway upstream of the bridge.

- The South Park business district is located on 14th Avenue S. south of the waterway, and some of the properties on this street would be acquired for construction of some alternatives. If a substantial number of businesses are displaced, the viability of the commercial district could be at risk.

- Moreover, construction of any type of alternative would most likely necessitate construction when young and adult endangered Chinook salmon are migrating. In addition, the in-water construction would temporarily disturb hazardous-material-contaminated sediments in the Duwamish Waterway.

During the alternatives selection process, King County developed five alternatives to evaluate in detail. These include doing nothing (No Action Alternative), rehabilitating the existing bridge (Rehabilitation Alternative), constructing a new bascule bridge (Bascule Bridge Alternative), or constructing a 65-foot (Mid-Level Fixed-Span Bridge Alternative) or a 100-foot (High-Level Fixed-Span Bridge Alternative) bridge.

This document has been prepared to help government agencies make a decision on this project. It describes the potential environmental impacts, both good and bad, for each of the alternatives. It does not present a recommendation to government decision-makers on which alternative is "best" or should be selected. As a public document, it is available to anyone who requests a copy.

This chapter summarizes the environmental impacts and the conclusions of the analysis contained in the document. The potential environmental impacts are shown in a table at the end of this chapter. The Glossary preceding this chapter provides definitions to technical terms used in this document.

S.2 Regulatory Context

This document is the Draft Environmental Impact Statement (Draft EIS) for the proposed South Park Bridge Project. This project to take no action, to rehabilitate, or to replace the South Park Bridge is evaluated in detail in this document. The King County Department of Transportation is the project proponent and local lead agency. Because the project involves federal funding, the state and federal lead agencies for the purposes of the environmental review process are the Washington State Department of Transportation and the Federal Highway Administration, respectively.

The information and analyses presented in this document satisfy the applicable requirements of the following: the National Environmental Policy Act [United States Code, Chapter 42, Part 4321, et seq]; the federal Council on Environmental Quality regulations that implement NEPA [Code of Federal Regulations, Chapter 40, Parts 1500–1508]; the Federal Highway Administration's NEPA implementation regulations [Code of Federal Regulations, Chapter 23, Part 771]; and Washington's State Environmental Policy Act [Revised Code of Washington, Chapter 43.21C, and Washington Administrative Code, Chapter 197-11].

These regulations ensure members of the public, as well as local, state, and federal agencies, will be given an opportunity to review and comment on the project alternatives and the environmental impact analysis presented in this Draft EIS. Following the publication of the Draft EIS and the comment period, King County, in conjunction with the Washington State Department of Transportation and the Federal Highway Administration, will select the project preferred alternative. Subsequently, a Final EIS and Record of Decision will be prepared and issued on the preferred alternative. Once the Record of Decision is signed by FHWA, then King County will be able to move forward with final design and engineering.

This chapter summarizes the 14 key topics discussed in detail in this document. These topics include:

- Purpose of the project
- Need for the project
- Project goals and objectives
- Related actions
- Alternatives previously considered but rejected
- Proposed project alternatives
- Preferred alternative
- Estimated project cost and construction schedule
- Needed right of way and property acquisition
- Potential environmental impacts and mitigation measures
- Major adverse impacts that can not be avoided
- Areas of controversy and uncertainty
- Unresolved issues
- Permits, licenses, and other approvals required

S.3 Purpose of the Project

The purpose of the South Park Bridge Project is to find the most reasonable long-term solution to address the deteriorated condition and increasing seismic vulnerability of the historic South Park Bridge and to maintain the transportation link provided by the existing bridge.

S.4 Need for the Project

The South Park Bridge is a major link in the regional transportation network. It connects East Marginal Way S. and SR-99, two key north-south arterials in Seattle's Duwamish industrial area. The bridge and S. Cloverdale Street are designated as heavy truck routes by King County. They are not designated as Major Truck Streets in the City of Seattle Comprehensive Plan or Freight Mobility Strategic Action Plan, however, the City of Seattle allows for the occasional use of the bridge for "over-legal trips" when a truck weight or size exceeds normal roadway restrictions. The commercial freight trucks service the area industries and businesses. The bridge is also a critical route for fire and emergency medical services for the South Park community, the Boeing complex in the City of Tukwila, and Seattle's Georgetown neighborhood. Furthermore, transportation studies determined that residents of the South Park community, as well as a significant number of residents of Burien, Tukwila, and Renton, use the bridge to travel north across the Duwamish waterway to both jobs and retail commercial districts in south Seattle.

But, the stability of the South Park Bridge and its ability to open and close properly are increasingly at risk. The primary cause of this problem dates back to how the bridge was constructed. At that time, the piles (long wooden posts) that support the north large foundation pier in the Duwamish Waterway were not driven deep enough into the riverbed to ensure the maximum support for that pier. This inadequacy has resulted in gradual movement of the bridge piers over the decades. In turn, this has caused misalignment of the movable bascule leaves and cracking in the concrete bascule piers, both of which have resulted in operational difficulties.

Poor quality concrete used in the original construction of the bridge also is causing chemical deterioration of structural elements. In particular, substantial concrete deterioration is occurring below the waterline of the in-water concrete pier columns.

Furthermore, the bridge has been damaged by several earthquakes. The most recent was the 2001 Nisqually Earthquake, which required major repairs to the bridge that cost over $740,000. The inadequate depth of the existing bridge piles also places the bridge at great risk of substantial damage from future earthquakes.

Therefore, the overall condition of the existing South Park Bridge is very poor. The 2002 bridge inspection conducted by King County recorded an existing condition rating of 6.0 out of a possible score of 100 based on Federal Highway Administration criteria (King County 2002c). This was among the lowest ratings given any bridge structure in the State of Washington. Thus, despite substantial ongoing maintenance and repairs for this bridge, it is a critical link in the regional transportation network that has suffered considerable deterioration over the past 74 years. Furthermore, its condition will continue to decline.

S.5 Project Goals and Objectives

The goal of the South Park Bridge Project is to select the most reasonable alternative that would maintain the vital regional transportation link the bridge currently provides. Key objectives include the following:

- Use current roadway design standards.
- Design the roadway and bridge to meet future roadway capacity needs for vehicles as well as heavy and oversized trucks.
- Provide a facility for both pedestrians and bicyclists to cross the Duwamish Waterway.
- Minimize right of way, property acquisition, and land use impacts in the South Park community.
- Maintain or improve the vertical and/or horizontal clearance of the Duwamish Waterway navigation channel (dredged portion of the river for use by large commercial vessels).

S.6 Related Actions

There are no related actions to the proposed South Park Bridge Project. No other roadway project must be constructed either before or after the South Park Bridge Project is constructed in order that the benefits of the project can be realized. No other environmental review is anticipated for the project except that required for the completion of this EIS, the issuance of the Record of Decision, and project permitting.

S.7 Alternatives Previously Considered But Rejected

Over the past 10 years, King County has evaluated a number of engineering concepts to rehabilitate or replace the South Park Bridge. Several alignments (centerline of a specific route) and conceptual engineering designs have been evaluated. Based on technical evaluations comparing and contrasting these alternatives, King County determined that some of the alternatives were less reasonable than others.

In 1994, King County investigated potential alignments for a replacement bridge. Several alignments were considered, including alignments to both the east and west of the existing bridge alignment. The *14th/16th Avenue South Bridge Rehabilitation/Design Report* (Sverdrup 1994) determined that alignments to the east of the existing bridge would have substantial land use impacts, especially considering the close proximity of several Boeing Plant 2 buildings. This study

recommended that the alignment of a replacement bridge should be approximately 80 feet west of the existing bridge centerline. This close proximity would minimize land use impacts to both Boeing properties as well as small commercial and industrial properties in the South Park community. In addition, it would allow traffic to continue to use the existing bridge during construction of a replacement bridge.

As part of the current project effort, King County developed and evaluated several preliminary alternatives for bridge replacement. The *Summary Technical Memo—Alternatives Development and Screening* (Parsons Brinckerhoff 2002) compared and contrasted these preliminary alternatives. Key design criteria included incorporation of current transportation engineering standards for the cross-section, alignment, design speed, maximum grade, and transition segment. These preliminary alternatives included both movable-span bridges and fixed-span bridges as listed below:

- Fixed-Span Bridges
  - Low level—approximately 35 feet vertical clearance above the water
  - Mid level—approximately 65 feet vertical clearance above the water
  - High level—approximately 100 feet vertical clearance above the water

- Movable-Span Bridges
  - Bascule bridge
  - Vertical lift bridge
  - Swing bridge

- Tunnel Concept

Four of these preliminary alternatives were determined to be less reasonable than the others. Screening criteria used to reject these four preliminary alternatives included the following: regional mobility, local access, waterway navigation, community impacts, aquatic habitat protection, construction impacts, and cost.

Among the fixed-span bridges, the low-level fixed-span bridge was not desirable because its vertical clearance of approximately 35 feet would severely limit the height of commercial and recreational boats that currently travel upstream of the South Park Bridge.

Two of the movable bridges were dropped from further consideration. The vertical-lift bridge was determined to have substantial visual (support structures extending 150–200 feet above the water) and traffic (10–15 minutes to operate) impacts. In comparison, the operation of a bascule bridge would require an estimated 4–6 minutes to open and close the bridge for marine traffic. The operation of the swing bridge also would be slow and would increase traffic delays when the bridge is opened for navigation traffic (10–15 minutes to operate). The height of the support structures and/or bridge control towers required to operate this movable bridge

would be taller than surrounding buildings in South Park. The operation of this type of bridge also would require the alignment of the bridge to be located an estimated 150 feet downstream of the existing bridge to allow use of the existing bridge during construction, thus substantially impacting the residential neighborhood west of the existing bridge as well as the Boeing complex on the north side of the Duwamish Waterway.

The tunnel concept was eliminated because the construction activities would cause potentially severe disturbance to known contaminated river bottom soils and sediments, irrespective of using the cut-and-cover or boring construction methods. The cut-and-cover method of construction could affect migration of endangered salmon species. In addition, construction of the tunnel would affect a substantial number of properties in the South Park community considering the length required to construct the tunnel below the depth of the waterway without exceeding maximum roadway grades. This aspect of the tunnel design would extend the south portal of the tunnel to the south of S. Henderson Street and the north terminus would extend into Boeing Field.

King County also evaluated methods to rehabilitate the existing bridge in a manner that would preserve and restore the historic features of the bridge. The *Rehabilitation Feasibility Study Technical Memorandum* (Parsons Brinckerhoff 2003a) investigated methods to rehabilitate the bridge in compliance with federal and state historic preservation laws and community interest to maintain the historic bridge gateway to the community. However, the effort to design a rehabilitation alternative was complicated by the very poor condition of key structural features, particularly the bascule piers. A study compared and contrasted reinforcing the existing piers and constructing new replacement piers. The study concluded that reinforcement of the existing structures would be less reasonable for the long-term life of the bridge structure, and constructing new replacement piers is not consistent with federal rehabilitation guidelines.

S.8 Proposed Project Alternatives

Based on the evaluation of the preliminary alternatives and consideration of agency and public comment, a total of five alternatives were selected for detailed environmental review in this Draft EIS. Two of the alternatives are bascule bridges (like the existing bridge) and two are fixed-span bridges. These alternatives include the No Action Alternative and the following Build Alternatives:

- Rehabilitation Alternative
- Bascule Bridge Alternative
- Mid-Level Fixed-Span Bridge Alternative (65 feet vertical clearance)
- High-Level Fixed-Span Bridge Alternative (100 feet vertical clearance)

No Action Alternative

The evaluation of the No Action Alternative is required by both federal and state environmental regulations. For this project, this alternative assumes the existing bridge would need to be closed in the future. Due to the existing poor condition of the bridge and earthquake vulnerability, this is assumed to occur sometime before 2027. Bridge closure and removal would occur (1) when the bridge could no longer operate reliably, (2) if maintenance costs become more than King County is willing or able to expend, or (3) if the bridge is damaged beyond repair due to an earthquake or other unforeseen event. Once closed, U.S. Coast Guard regulations would require that the inoperable bridge be removed.

Rehabilitation Alternative

The Rehabilitation Alternative would retain the historic character of the four-non-standard-lane existing bridge, while ensuring the life of the rehabilitated bridge would be comparable to the anticipated 75-year life of a newly constructed bridge. New bascule piers would be constructed. Other bridge structural elements would be refurbished, repaired, or reconstructed. Existing historic bridge features of the bridge would be preserved to the greatest extent possible. The grade of the bridge deck would remain approximately 5 percent for two standard southbound lanes and one standard northbound lane. Sidewalks would be reconstructed on either side of the roadway pavement. The bridge touchdown would be north of Dallas Avenue S., but road improvements would extend south of S. Sullivan Street. New pier protection structures would be constructed to prevent vessels from hitting the bascule piers and to demarcate the 118-foot width of the Duwamish Waterway navigation channel under the bridge.

Bascule Bridge Alternative

The Bascule Bridge Alternative would involve construction of a new movable bridge that would be similar to the design of the existing bridge. At an estimated 935 feet abutment-to-abutment, this bridge would be only slightly longer than the existing bridge. The new bridge would have two bascule leaves that would open and close like a “drawbridge.” The new bridge deck would be concrete, not a grated deck (current bridge design). When closed, the bridge deck would be approximately 34 feet above the water. The grade of the bridge deck would be approximately 5 percent for the two standard northbound and two standard southbound lanes. A combined 13-foot bike/pedestrian path would be constructed on the west side of the bridge. The bridge touchdown would be at S. Sullivan Street, but road improvements would extend to S. Cloverdale Street. New pier protection structures would be constructed defining a 125-foot navigation channel under the bridge.

Mid-Level Fixed-Span Bridge Alternative

The Mid-Level Fixed-Span Bridge Alternative would have a concrete bridge deck supported by a number of bridge piers. (Figure S-4 is a photo of a typical fixed-span bridge.) Some of the piers would be on land, but two would be in the water. The height of the bridge deck would be approximately 65 feet above the water and the length would be an estimated 1,660 feet abutment-to-abutment. The grade of the bridge deck would be approximately 8 percent for the two standard northbound and two standard southbound lanes. A combined 13-foot bike/pedestrian path would be constructed on the west side of the bridge but would connect with a zigzag design ramp at approximately S. Orr Street to allow bicyclists and pedestrians to descend quickly to the street level below. The bridge touchdown would extend south of S. Cloverdale Street such that the grade of the new roadway would be slightly above the existing level. Road improvements, however, would continue to allow direct access to the bridge from S. Cloverdale Street. Like the Bascule Bridge Alternative, new pier protection structures would be constructed to define a 125-foot navigation channel under the bridge.

Figure S-4
Example of a Fixed-Span Bridge: West Seattle Bridge

High-Level Fixed-Span Bridge Alternative

The High-Level Fixed-Span Bridge Alternative would have a solid bridge deck supported by a number of bridge piers, similar in design to the Mid-Level Fixed-Span Bridge Alternative. The maximum height of the bridge deck would be approximately 100 feet above the water and the length would be an estimated 2,332 feet abutment-to-abutment. The U.S. Coast Guard maintains the Duwamish Waterway as a navigable channel and, in a letter to King County dated June 10, 2002, they acknowledged that a fixed-span bridge alternative with a vertical clearance of a minimum of 100 feet to accommodate existing commercial and

recreational boat traffic using the Duwamish Waterway would be acceptable. In addition, this fixed-span bridge alternative is required for comparative analysis to the movable Bascule Bridge Alternative per Federal Highway Administration regulations [Code of Federal Regulations, Chapter 23, Part 650.809]. This comparison is important especially considering the substantial difference in construction and operation costs between bascule and fixed-span bridges.

The design of the High-Level Fixed-Span Bridge Alternative is similar to the 65-foot vertical clearance bridge. The grade of the bridge deck,however, would slightly exceed 8 percent for the two standard northbound and two standard southbound lanes. A 13-foot combined bike/pedestrian path would be constructed on the west side of the bridge for the entire length of the elevated portion of the bridge. Touchdown of the alternative would be just north of S. Trenton Street. To continue to provide access to the bridge for the community, road improvements would extend on S. Trenton Street west to 12th Avenue S. and north to S. Cloverdale Street. Finally, new pier protection structures would be constructed for the 125-foot channel in the same fashion as described for both the Bascule Bridge and Mid-Level Fixed-Span Bridge alternatives.

S.9 Preferred Alternative

At this time, King County does not have a preferred alternative for the South Park Bridge Project. The County will select a preferred alternative in conjunction with the Federal Highway Administration and Washington State Department of Transportation after review of comments on the Draft EIS received from the public, government agencies, and tribes. The preferred alternative will be presented in the Final EIS along with additional analysis of potential environmental impacts for any of the alternatives. The Final EIS will also have responses to the comments on the Draft EIS that were received during the public comment period.

S.10 Estimated Project Cost and Construction Schedule

In the *Structural Alternatives Study* (Parsons Brinckerhoff 2003d), King County developed estimated costs for the proposed project alternatives and a conceptual construction sequencing plan and schedule. The estimated construction costs include the costs for additional engineering work required to prepare the final plans, specifications, and estimates; purchase of needed right of way; and the labor and materials for the construction of each alternative. These cost estimates are shown in 2003 dollars and in 2008 dollars (mid-point of the assumed construction period) in Table S-1. The demolition activities associated with the No Action Alternative would cost the least amount of all of the alternatives at approximately $7 million (2003 dollars). The most expensive of the Build Alternatives would be the Bascule Bridge Alternative, which would cost approximately $77 million (2003 dollars).

Table S-1. Cost Estimates of the Project Alternatives

Alternative	Total Construction Cost (2003 dollars)	Total Construction Cost (2008 dollars)	75-Year Total Operation & Maintenance Costs (2003 dollars)[1]
No Action	$7,000,000	$9 million	$0 [1]
Rehabilitation	$63,930,000	$74 million	$11 million
Bascule Bridge	$77,334,000	$90 million	$11 million
Mid-Level Fixed-Span Bridge	$61,523,000	$71 million	$2 million
High-Level Fixed-Span Bridge	$70,460,000	$82 million	$3 million

Note:
[1]The operation and maintenance costs are the total amounts over the 75-year life of each of the bridge alternatives. These costs do not include the future annual operation and maintenance costs (averaging approximately $286,000 per year) for the existing bridge (from present until the existing bridge is demolished, or until construction were to start for the Rehabilitation Alternative).

Source: Structural Alternatives Study (Parsons Brinckerhoff 2003d).

This table also shows the total long-term estimated operation and maintenance costs for the 75-year life of the bridge alternatives. These cost estimates do not include the current operation and maintenance costs of approximately $200,000 to $300,000 per year. These costs associated with the existing bridge would continue until the time that the existing bridge is under construction for rehabilitation or the existing bridge is demolished following completion of one of the Replacement Bridge Alternatives. As shown in the table, there is no long-term operation and maintenance cost associated with the No Action Alternative following demolition of the existing bridge. The cost of operating and maintaining a movable bridge, however, is substantial at $11 million and is estimated to be approximately four to five times the operation and maintenance cost of a fixed-span bridge alternative.

The construction activities vary for each of the proposed project alternatives. The No Action Alternative only involves demolition and removal of the existing bridge. Each of the replacement bridge alternatives involves both construction of a new bridge as well as demolition and removal of the existing bridge. Construction activities associated with the Rehabilitation Alternative include repair, refurbishment, and reconstruction. These reconstruction activities would include some structural elements and the installation of new electrical and mechanical components.

The duration of construction and/or demolition activities for the Build Alternatives would last approximately two to three years. Table S-2 shows the anticipated construction period for each of the project alternatives. The

construction period associated with the No Action Alternative would last approximately eight months. The construction of the Bascule Bridge Alternative would take the longest, but would be less than three years. This table also shows the anticipated duration of closure of the existing bridge for each alternative. Bridge closure for the Rehabilitation Alternative would be the worst situation with closure taking an estimated 30 of the 32 months of the construction period. Bridge closure for the other alternatives would total approximately four weeks.

Table S-2. Construction/Demolition Duration for the Project Alternatives

Alternative	Construction/ Demolition Duration	Existing Bridge Closure
No Action	8 months	Bridge closed, then demolished and removed.
Rehabilitation	32 months	Bridge closed for 30 months and open for about two months.
Bascule Bridge	33 months	Bridge closed for short-term temporary periods (about four weeks total).
Mid-Level Fixed-Span Bridge	20 months	Bridge closed for short-term temporary periods (about four weeks total).
High-Level Fixed-Span Bridge	24 months	Bridge closed for short-term temporary period (about four weeks total).

Source: *Structural Alternatives Study* (Parsons Brinckerhoff 2003d).

Construction of the selected bridge alternative is anticipated to start within the next several years. For the analysis in this document, the bridge is assumed to be completed by 2009. The funding of some alternatives, however, is uncertain and construction could be delayed several years.

S.11 Needed Right of Way and Property Acquisition

Additional property must be purchased for construction of all of the Build Alternatives. This land is needed for right of way for construction of the bridge and road improvements. In addition, property is needed for a construction staging area (temporary material and equipment storage area during construction). It is also assumed some properties would be acquired due to loss of access to 14th Avenue S. No property would need to be purchased for the No Action Alternative.

The number of parcels affected by partial or total acquisition increases based primarily on the bridge length of each project alternative (see Section S.8). The

same is true for the total area that would be acquired. Of the Build Alternatives, the Rehabilitation Alternative would affect the fewest number of parcels and the smallest land area. The High-Level Fixed-Span Bridge Alternative would affect the greatest number of parcels and the largest area. Table S-3 shows the number of parcels and total area affected for each of the project alternatives.

Table S-3. Right of Way and Property Acquisition by Alternative

Alternative	Parcels	Total Area
No Action	0	0.0 acres
Rehabilitation	3	0.67 acres
Bascule Bridge	7	2.11 acres
Mid-Level Fixed-Span Bridge	14	3.04 acres
High-Level Fixed-Span Bridge	39	7.15 acres

Source: *Relocations Technical Report* (Parsons Brinckerhoff 2004e).

S.12 Potential Environmental Impacts and Mitigation Measures

The Draft EIS summarizes the major environmental impacts and recommended mitigation measures associated with each of the proposed project alternatives. The potential environmental impact issues addressed in the document are listed below. Table S-4 at the end of this chapter is a summary of key construction and operation impacts that distinguish the alternatives.

- Transportation
- Relocations
- Land use
- Economics
- Social elements
- Cultural resources
- Visual assessment
- Air quality
- Noise and vibration
- Utilities
- Water resources
- Fish, wildlife, and vegetation
- Geology and soils
- Hazardous materials

S.13 Major Adverse Impacts That Can Not Be Avoided

Most of the potential environmental impacts arising from the construction and operation of the project alternatives would not result in major adverse impacts. Proposed mitigation measures would avoid, reduce, or minimize the effects of these potential impacts. Each of the alternatives, however, would result in some major unavoidable impacts.

No Action Alternative

For the No Action Alternative, the existing South Park Bridge would be demolished and removed some time before 2027. The demolition of this alternative would cause temporary localized disturbance of the substrate and turbidity in the Duwamish Waterway. The project area is located within the area proposed as critical habitat for both the Chinook salmon and bull trout. These construction effects may temporarily affect estuarine fishes, including migrating adult and juvenile threatened Chinook salmon, threatened bull trout, and a species of concern, the coho salmon.

This alternative also would result in the permanent loss of the bridge, which is a listed resource on the National Register of Historic Places, the Washington Heritage Register, and the King County Landmark Register. This alternative would not be consistent with local or regional transportation, land use, or South Park neighborhood planning goals and policies. The removal of the bridge would affect the long-term ability to provide fire protection and emergency medical services to the South Park community as well as other nearby industrial and residential neighborhoods. This alternative would result in disproportionate though not high indirect impacts on minority, Hispanic/Latino, or low-income populations who reside, work, or operate businesses in the community and region following bridge demolition. These impacts would include both negative impacts as well as benefits to the community. As such, this alternative would be in compliance with federal and State anti-discrimination laws, regulations, and guidance (including Title VI of the Civil Rights Act of 1964 and Presidential Executive Order 12898 on environmental justice).

Rehabilitation Alternative

The proposed Rehabilitation Alternative would restore the existing historic character of the South Park Bridge. The project area is located within the area proposed as critical habitat for both the Chinook salmon and bull trout. The construction activities would cause temporary localized disturbance of the substrate and turbidity in the Duwamish Waterway. These construction effects may temporarily affect estuarine fishes, including migrating adult and juvenile threatened Chinook salmon, threatened bull trout, and a species of concern, the coho salmon. The duration of the in-water impacts, however, would be substantially longer than the anticipated duration for the demolition activities

associated with the No Action Alternative due to the extensive reconstruction required of the existing bridge bascule piers.

The proposed repairs, refurbishments, and reconstruction, however, would not meet the Secretary of Interior's standards for rehabilitation for historic resources. As such, the historic elements that make the bridge eligible for National Register of Historic Places listing would be lost and would result in a high adverse effect on this historic resource. The proposed construction of the bridge also requires bridge closure for approximately 30 months, which could jeopardize the economic long-term viability of the business district and the community. These disproportional indirect effects on minority populations during the construction period could be reduced in severity with substantial mitigation. As such, this alternative would be consistent with federal and State anti-discrimination laws, regulations, and guidance (including Title VI of the Civil Rights Act of 1964 and Presidential Executive Order 12898 on environmental justice).

Bascule Bridge Alternative

The Bascule Bridge Alternative would result in the permanent loss of the historic bridge structure as well as demolition/removal of the historic 14th Avenue S. Red Brick Road Remnant adjacent to the bridge. The construction effects (disturbance of Duwamish Waterway substrates and turbidity) associated with this alternative would be very similar to those described for the Rehabilitation Alternative. Required property acquisition would affect seven properties. This would affect some minority property owners, business owners, low-income employees, and residents. These impacts, however, would not be high, so this alternative would be consistent with federal and State anti-discrimination laws, regulations, and guidance (including Title VI of the Civil Rights Act of 1964 and Presidential Executive Order 12898 on environmental justice).

Mid-Level Fixed-Span Bridge Alternative

The Mid-Level Fixed-Span Bridge Alternative would result in the permanent loss of the historic bridge structure, demolition/removal of the 14th Avenue S. Red Brick Road Remnant adjacent to the bridge, as well as loss of context to the historic South Park Hall located at 8611/13 14th Avenue S. The construction effects associated with this alternative would be nearly the same as those described for the Bascule Bridge Alternative, except the duration of the in-water construction activities would be considerably shorter. This alternative would not be consistent with the South Park neighborhood land use planning goals and policies. The length of the bridge and its structure and new bridge lighting would introduce new barriers into the community and would affect community cohesion. The 65-foot vertical clearance of the bridge would affect upstream marine-dependent businesses, including Delta Marine Industries. A total of 14 properties would be acquired, which would disproportionately affect minority property owners, business owners, low-income employees, and residents in South Park and the Seattle metropolitan area. These effects would be disproportionate and high to

minority populations. As such, this alternative would not be in compliance with federal and State anti-discrimination laws, regulations, and guidance (including Title VI of the Civil Rights Act of 1964 and Presidential Executive Order 12898 on environmental justice).

High-Level Fixed-Span Bridge Alternative

The High-Level Fixed-Span Bridge Alternative would result in a number of substantial unavoidable adverse impacts. The in-water effects to the substrate and turbidity of the Duwamish Waterway would be the same as described for the Mid-Level Fixed-Span Bridge Alternative. Like the Mid-Level Fixed-Span Bridge Alternative, the construction of this alternative also would result in the permanent loss of the existing National Register of Historic Places listing of the historic South Park Bridge and demolition/removal of the 14th Avenue S. Red Brick Road Remnant. In addition, the context and viability of the South Park Hall, which is eligible for listing on the NRHP, would be adversely affected by the very close proximity of the 20-foot bridge abutment and, as such, acquisition of this building is assumed.

This alternative would introduce a very high structure and associated light and glare from the new bridge into the community. These effects and the construction of a new connector roadway on S. Trenton Street would create new barriers in the community. This would adversely affect the visual quality of the community. This action would not be consistent with adopted land use planning goals and policies due to the substantial displacement of land uses. In total, an estimated 39 properties would be acquired.

This alternative would adversely affect the social fabric and cohesion of the South Park minority community. The required acquisition of commercial properties and the many businesses located in buildings on these properties on 14th Avenue S. would affect six out of eight blocks of this Hispanic/Latino business district and would displace three-quarters of the businesses in the district. This alternative would also require acquisition of buildings owned by the Sea Mar Community Health Center, a non-profit organization dedicated to serving the Hispanic/Latino, minority, and low-income populations. These effects would affect the South Park community as well as the larger Hispanic/Latino community in the Seattle metropolitan area. This alternative would cause high and disproportionate impacts on members of minority and low-income populations residing, working, and operating businesses in South Park. As such, this alternative would not comply with federal and State anti-discrimination laws, regulations, and guidance (including Title VI of the Civil Rights Act of 1964 and Presidential Executive Order 12898 on environmental justice).

S.14 Areas of Controversy and Uncertainty

At this stage of studying the proposed project alternatives, there still remain some issues of controversy and uncertainty. These are listed below.

- Construction of several of the project alternatives would displace many businesses on 14th Avenue S. as well as access to businesses. There is concern that the aggregated effects on the South Park business district could affect the long-term stability of the remaining businesses in the commercial district as well as the stability of the entire community.
- Construction of the Mid-Level Fixed-Span Bridge Alternative and the High-Level Fixed-Span Bridge Alternative is expected to result in acquisition of a number of properties. Some properties (land and possibly buildings) would be acquired either for construction staging areas or roadway right of way. In addition, it is assumed other properties on 14th Avenue S. would be acquired because the business would lose access to the roadway. Some of these land uses or potentially different land uses, however, may be able to continue successfully on such properties and may not necessitate acquisition. The extent that properties actually need to be acquired due to loss of access is unknown.
- The existing South Park Bridge does not limit the vertical navigation clearance on the Duwamish Waterway. The proposed Mid-Level Fixed-Span Bridge Alternative (65 feet) and High-Level Fixed-Span Bridge Alternatives (100 feet), however, would restrict some existing and/or potentially some future boat traffic in the Duwamish Waterway, including large commercial and recreational boats and luxury boats manufactured upstream of the bridge. These vertical clearance restrictions could also affect other marine-dependent businesses and potential future development of such uses on upstream properties of the navigation channel.

S.15 Unresolved Issue

At this stage, there appears to be one major unresolved issue related to the proposed South Park Bridge Project. Following construction of the project alternatives, King County proposes to dispose of unneeded properties or portions of parcels that were acquired for project right of way or the construction staging areas. Any such disposal of property must be made in accordance with the Code of Federal Regulations, Chapter 23, Part 710.409. Furthermore, analysis of existing parcel sizes indicates that except for two parcels affected only by the High-Level Fixed-Span Bridge Alternative, the remnant parcels would be expected to meet minimum requirements for lot sizes based on current zoning. However, there remains considerable public concern over how these parcels would be redeveloped, whether or not lot line adjustment would allow combining of remnant parcels, and if future development would be consistent with the

neighborhood plan, local government comprehensive plans, and applicable zoning codes.

S.16 Permits, Licenses, and Other Required Approvals

Prior to the start of construction of the preferred alternative, the environmental review process must be completed. This document is a combined document that meets both federal and state environmental regulations. The final step in the National Environmental Policy Act environmental review process will be a Record of Decision, which will be issued by the Federal Highway Administration. The final step in the Washington State Environmental Policy Act environmental review process will be a Notice of Action published in the Washington State Department of Ecology Register. Once both of these actions have occurred, the project proponent, King County Department of Transportation, will be able to make a final decision to design and construct the preferred alternative.

Construction of the project would require King County to obtain a number of permits and other required approvals from several local government jurisdictions (City of Seattle, City of Tukwila, and King County), state agencies, and federal government regulatory agencies. The preliminary engineering plans for the project would be shared with government regulatory agencies to assess the specific list of permits, licenses, and/or approvals that would be required. A preliminary list of required federal, state, and local permits and approvals for construction of the proposed project may include the following:

U.S. Army Corps of Engineers

Section 10 Permit (navigation construction)
Section 404 Nationwide Permit

U.S. Coast Guard

General Bridge Act of 1946 (for bridge repair or replacement)

U.S. Fish and Wildlife Service

ESA, Section 7 Consultation

U.S. National Marine Fisheries Service

ESA, Section 7 Consultations

Washington Department of Ecology

Water Quality 401 Certification
NPDES general permit for stormwater discharges
NPDES permit for construction activities
Coastal Zone Management Certification

Washington Department of Fish and Wildlife

Hydraulic Project Approval

Washington Office of Archaeology and Historic Preservation

Section 106 Consultation

Puget Sound Clean Air Agency

Demolition notification (for any structure that might contain asbestos)

King County

Shoreline Substantial Development Permit
Sensitive Areas Review
Public Agency and Utility Exception
Clearing and Grading Permit
Demolition Permit
Haul Road Agreement
Street Use Permit
Noise Variance for Nighttime Construction

City of Seattle

Public Agency and Utility Exception
Drainage Approval/Permit
Clearing and Grading Permit
Demolition Permit
Haul Road Agreement
Street Use Permit
Noise Variance for Nighttime Construction

City of Tukwila

Shoreline Substantial Development Permit
Sensitive Areas Review
Public Agency and Utility Exception
Clearing and Grading Permit
Haul Road Agreement
Street Use Permit
Noise Variance for Nighttime Construction

Port of Seattle

Easement to construct over Duwamish Waterway bedlands

Lastly, King County will need to acquire property before any construction activities may begin on private property. For this project, property will be needed for right of way based on the final design of the project. In addition, property will need to be acquired for temporary construction staging areas. The acquisition or purchase of all private property will be conducted in compliance with the federal Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970, as amended [United States Code, Chapter 42, Part 4601, et seq,, and the Code of Federal Regulations, Chapter 49, Part 24] and the Washington Relocation Assistance-Real Property Acquisition Policy Act of 1971, as amended [Revised Code of Washington, Chapter 8.26, and Washington Administrative Code, Chapter 468-100].

Following the completion of the federal and State environmental review processes, acquisition of all required construction permits and approvals, and acquisition of all needed private property, construction activities will begin on rehabilitation or replacement of the South Park Bridge.

S.17 Summary of Environmental Impacts and Proposed Mitigation Measures

Table S-4 compares and summarizes the major environmental impacts associated with the alternatives evaluated in this Draft EIS. This table will be helpful to compare and contrast the advantages and disadvantages of each of the alternatives for all types of potential construction and operation environmental impacts.

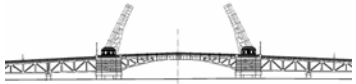

Table S-4. Comparison of Impacts by Alternative

Alternative	No Action	Rehabilitation	Bascule Bridge	Mid-Level Fixed-Span Bridge	High-Level Fixed-Span Bridge
Transportation and Mobility					
Construction Impacts	Start of permanent reroute of all traffic due to bridge closure and demolition	30-month bridge closure during 32-month construction period	Bridge closure limited to only 4 weeks	Bridge closure limited to only 4 weeks	Bridge closure limited to only 4 weeks
Transportation Facilities	No bridge No restriction of navigational channel	Roadway with 3 wider traffic lanes and slightly improved sidewalks Navigation channel same as existing (118 feet)	Roadway with 4 wider traffic lanes and a 13-foot ped/bike path Wider navigation channel (125 feet)	Roadway with 4 wider traffic lanes, 8% grade, and a 13-foot ped/bike path and zigzag ramp Wider navigation channel (125 feet), but maximum 65-foot vertical clearance	Roadway with 4 wider traffic lanes, 8+% grade, and a 13-foot ped/bike path Wider navigation channel (125 feet), but maximum 100-foot vertical clearance
Transportation Network Changes	14th Ave S./16th Ave S. would become a dead-end street on both the north and south shore of the Duwamish Waterway	Improved intersection of 14th Ave. S., Dallas Ave. S., and S. Sullivan St.	Both S. Sullivan St. and Dallas Ave. S. would have direct access to the new South Park Bridge through an improved intersection	S. Sullivan St. and Dallas Ave. S. would become underpasses Traffic could access bridge at S. Cloverdale St., which would be raised to meet the descending grade S. Orr St. would dead-end at 14th Ave. S. due to zigzag ramp	Reroute all bridge traffic to S. Trenton St. and 12th Ave. S. to S. Cloverdale St. Dallas Ave. S., S. Sullivan St., and S. Cloverdale St. would become underpasses S. Donovan St. would dead-end at 14th Ave. S. due to bridge abutment
Relocations					
Construction and Operation Impacts	No parcels acquired No displacement of businesses, jobs, or residents	3 parcels acquired Displacement of 3 buildings, 3 businesses, 16 jobs, 2 dwellings, and 7 residents	7 parcels acquired Displacement of 5 buildings, 5 businesses, 29 jobs, 2 dwellings, and 7 residents	14 parcels acquired Displacement of 13 buildings, 17 businesses, 89 jobs, 3+ dwellings, and 10 residents	39 parcels acquired Displacement of 36 buildings, 26 businesses, 124+ jobs (and potentially an additional 180 jobs), 19+ dwellings, and 50 residents

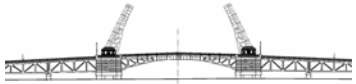

Table S-4. Comparison of Impacts by Alternative (continued)

Alternative	No Action	Rehabilitation	Bascule Bridge	Mid-Level Fixed-Span Bridge	High-Level Fixed-Span Bridge
Land Use					
Construction Impacts	No land acquired	0.67 acres acquired—residential and retail land uses	2.11 acres acquired—residential, retail, and restaurant land uses	3.04 acres acquired—residential, retail, and restaurant land uses	7.15 acres acquired—residential, retail, restaurant, health clinic, and wholesale distribution land uses
Plan Consistency and Land Use Changes	Not consistent with plans, but little change in land use	Consistent with plans and no change in land use	Same as Rehabilitation Alternative	Generally consistent with plans, but commercial district would be reduced	Not consistent with plans and commercial district substantially reduced, which could affect community character
Economics (also see Relocations)					
Access to Businesses	Permanent reroute due to loss of bridge, increased travel time, no change in on-street parking	Bridge operational, no change in travel time, no change in on-street parking	Bridge operational, no change in travel time, minor change in availability of on-street parking	Bridge operational, slight increase in travel time, substantial loss in available on-street parking	Bridge operational, increased travel time due to permanent reroute on S. Trenton St. and 12th Ave. S., majority of on-street parking is unavailable
Business District	Harmful to businesses dependent upon through-traffic; some businesses could fail and displace jobs	Good outlook for businesses that survive the construction period bridge closure	Good outlook for businesses	Good outlook for businesses, but business patterns could shift or relocate with smaller business district	Three-quarters of existing businesses displaced, viability of business district in question
Marine Businesses	No vertical or horizontal clearance restrictions, substantial benefits to marine businesses	Vertical and horizontal clearances continue to be less than permitted, but no change for marine businesses	Vertical and horizontal clearances meet permit guidelines, slight benefits to marine businesses	Vertical clearances substantially less than permitted, substantial adverse effects on barge operators and upstream businesses, i.e. Delta Marine Industries	Vertical and horizontal clearances meet permit guidelines, but may still affect barge operators and upstream businesses in the future due to increasing vessel sizes
Property Values	Commercial values could decline, but residential values could increase	Little to no changes to property values	Little to no changes to property values	Some commercial properties may lose some value	Substantial reduction in commercial property values expected, but depends on redevelopment opportunities

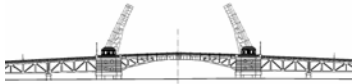

Table S-4. Comparison of Impacts by Alternative (continued)

Alternative	No Action	Rehabilitation	Bascule Bridge	Mid-Level Fixed-Span Bridge	High-Level Fixed-Span Bridge
Social Elements and Environmental Justice (also see Transportation & Relocations)					
Construction Impacts	Temporary deterioration in quality of life due to local noise and air pollution and traffic detours for 8 months in immediate project area	Similar to No Action Alternative except 30-month bridge closure; would affect vehicle and transit access to/from the community; would also effect fire, police, emergency medical services access and response time	Bridge closure would affect vehicle and transit access to/from the community as well as the fire, police, and emergency medical services access and response time only an estimated 4 weeks	Similar to the Bascule Bridge Alternative except duration 20 months and larger area affected by construction disruption	Similar to the Bascule Bridge Alternative except construction period duration 24 months and substantially larger area affected by construction disruption
Community, Social, and Public Services	Would permanently changed fire, police, and emergency medical services access and use of alternative bridges would increase response times	No change in long-term access to South Park for community, social, or public services	Same as Rehabilitation Alternative	Fire, police, and emergency access and/or response time could be affected by changes in street network or bridge roadway grade	Two Sea Mar Community Health Center buildings displaced Fire, police, and emergency access and/or response time would increase due to traffic reroute to S. Trenton St. and bridge roadway grade
Pedestrian, Bicycle, and Transit	No long-term access across Duwamish Waterway at 14th/16th Ave. S. due to permanent reroute Use of reroute may not be reasonable for pedestrians/bicyclists Some transit routes to nearby neighborhood would be eliminated	Continued long-term access across the Duwamish Waterway Very limited change to ped/bike access and no change in transit routes Continue use of non-standard ped/bike path on bridge	Similar to Rehabilitation Alternative but improved 13-foot ped/bike path on bridge and street network facilities	Similar to Bascule Bridge Alternative except minor changes to some transit routes and shelters and 8% grade and ped/bike zigzag ramp may discourage use	Substantial changes to ped/bike access due to permanent reroute on S. Trenton St. Several transit routes permanently rerouted due to no bridge access to/from 14th Ave. S. and S. Cloverdale St., bus shelters relocated Improved 13-foot ped/bike path on bridge, but 8+% grade may discourage use

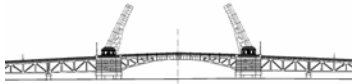

Table S-4. Comparison of Impacts by Alternative (continued)

Alternative	No Action	Rehabilitation	Bascule Bridge	Mid-Level Fixed-Span Bridge	High-Level Fixed-Span Bridge
Community Cohesion	Permanent traffic reroutes increasing isolation of community and potentially increasing cohesion due to reduced through-traffic and associated noise and air pollution	No change in community cohesion expected	Little change in community cohesion anticipated	Intrusion of new elevated bridge structure would degrade community cohesion	Major intrusion of new elevated bridge and permanent rerouting of traffic on S. Trenton St. would substantially deteriorate community cohesion.
Environmental Justice	Mixed effects on local minority and low-income residents and businesses Action would be consistent with federal and state anti-discrimination laws, regulations, and guidance	Temporary indirect impacts to local and regional minority and low-income residents, business and property owners would be disproportional and high With substantial mitigation measures, this action would be consistent with federal and state anti-discrimination laws, regulations, and guidance	Direct impacts to some local minority and low-income residents, business and property owners, but would not be severe Action would be consistent with federal and state anti-discrimination laws, regulations, and guidance	Direct impacts to local minority and low-income business and property owners, workers, and residents and effects would be disproportional and high Action would not be in compliance with federal and state anti-discrimination laws, regulations, and guidance	Direct impacts to local and regional minority and low-income business and property owners, workers, residents, and medical clinic and effects would be disproportional and high. Action would not comply with federal and state anti-discrimination laws, regulations, and guidance
Cultural Resources					
Construction Impacts	No impacts to Red Brick Road Remnant One season effect on Muckleshoot and Suquamish tribal fishing	Temporary direct impacts to the Red Brick Road Remnant Tribal fishing affected for two seasons	Demolition/removal of the Red Brick Road Remnant Tribal fishing affected for two seasons	Demolition/removal of the Red Brick Road Remnant and temporary indirect impacts to South Park Hall Tribal fishing affected for one to two seasons	Same as the Mid-Level Fixed-Span Bridge Alternative, except direct impacts to South Park Hall and indirect impacts to 1215 S. Cloverdale St.
Archaeological Resources	No effects	Unknown, but adverse effects could be high	Same as the Rehabilitation Alternative	Same as the Rehabilitation Alternative	Same as the Rehabilitation Alternative
Historic Bridge	Loss of NRHP-listed bridge	Does not meet Secretary of Interior's rehabilitation standards, bridge no longer eligible for NRHP listing	Loss of NRHP-listed bridge	Loss of NRHP-listed bridge	Loss of NRHP-listed bridge

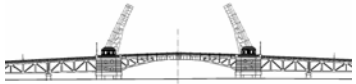

Table S-4. Comparison of Impacts by Alternative (continued)

Alternative	No Action	Rehabilitation	Bascule Bridge	Mid-Level Fixed-Span Bridge	High-Level Fixed-Span Bridge
Area Historic Resources	Potential minor indirect effects to historic resources in the study area due to long-term effects of bridge removal on community	Negligible indirect effects on study area historic resources	Negligible indirect effects on study area historic resources	Adverse indirect effects on the context of the South Park Hall and minor indirect effects on Boeing Plant 2	Adverse direct effects to the South Park Hall due to assumed acquisition, and minor indirect effects to other area historic resources due to the overall scope of the alternative
Visual Assessment					
Visual Changes and Light/Glare	Distant views of the city and mountains from bridge deck would be eliminated Reduced views from the bridge to the adjacent districts Absence of operational impacts would result in increased intactness	No substantial visual changes Little to no change in visual vividness, intactness, unity, or light and glare from the bridge	No substantial visual changes, especially if new bridge includes historical details Increased visual vividness, but little change to intactness, unity, or light and glare from the bridge	Slight increased exposure of residential neighborhood to the view of increased elevation of passing motorists New structure alignment encroaches residential areas west of the bridge Increased light and glare from the bridge and into adjacent land uses	Views of city skyline would be significantly enhanced, though very short and from distant viewpoint New structure encroaches residential areas west of the bridge and south along the alignment as it soars high above existing homes Older character of the few existing buildings would be too sparse to look like a viable commercial district Substantially increased light and glare from the bridge along the existing alignment and through residential neighborhood on S. Trenton St. and 12th Ave. S.

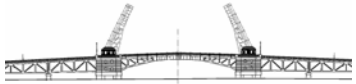

Table S-4. Comparison of Impacts by Alternative (continued)

Alternative	No Action	Rehabilitation	Bascule Bridge	Mid-Level Fixed-Span Bridge	High-Level Fixed-Span Bridge
Air Quality					
Predicted Long-term CO Concentrations	Predicted concentrations substantially lower than NAAQS emission standards (CO 9 ppm)	Same as No Action	Same as No Action	Same as No Action	Same as No Action
Noise and Vibration					
Operation Noise Levels	Noise level for 10 residences could exceed FHWA mitigation criteria Less than existing conditions (14 residences)	Noise level for 20 residences could exceed FHWA mitigation criteria More than existing conditions	Noise level on 21 residences could exceed FHWA mitigation criteria More than existing conditions	Noise levels on 21 residences could exceed FHWA mitigation criteria More than existing conditions	Noise levels for 16 residences could exceed FHWA mitigation criteria Slightly more than existing conditions
Utilities					
Construction Impacts	Utilities generally unaffected or abandoned in place, some utilities could be damaged Demolition activities could damage utilities Very minor impacts due to small disturbed area	Similar to No Action Alternative plus existing utilities serving the bridge would need to be upgraded or replaced Minor impacts due to relatively small disturbed area	Similar to the Rehabilitation Alternative except new utilities would need to be constructed for bridge operation Moderate impacts with disturbed area extending south to S. Cloverdale St.	Similar to the Bascule Bridge Alternative Moderate impacts with disturbed area extending south to S. Donovan St.	Similar to the Bascule Bridge Alternative Substantial impacts with disturbed area extending south to S. Trenton St., along S. Trenton St., and north on 12th Ave. S. to S. Cloverdale St.
Water Resources					
Stormwater Quantity	Reduced impervious surface, but site restoration would change surface water flows and require new stormwater facilities	No new impervious surface, but would require new stormwater facilities	Slight increase in new impervious surface, would require new stormwater facilities	Increase in new impervious surface, would require new stormwater facilities	Increase in new impervious surface, would require new stormwater facilities
Waterway (100-year peak flow rate)	Moderate reduction in water surface elevation	No change in water surface elevation	Slight Increase in water surface elevation	Decreased water surface elevation	Decreased water surface elevation

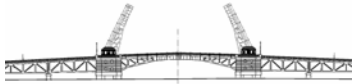

Table S-4. Comparison of Impacts by Alternative (continued)

Alternative	No Action	Rehabilitation	Bascule Bridge	Mid-Level Fixed-Span Bridge	High-Level Fixed-Span Bridge
Fisheries, Wildlife and Vegetation					
Construction/Demolition Impacts	Birds, including foraging endangered bald eagles and osprey, would not be affected due to relative high ambient noise levels Estuarine fishes using the waterway habitat for juvenile rearing may be affected by temporary turbidity and disturbance of substrate Migrating adult and juvenile threatened Chinook salmon and threatened bull trout, and a species of concern, the coho salmon, could be affected by in-water activities 8-month duration of construction	Similar to No Action Alternative except impact area expanded to include temporary docks & temporary adjacent construction trestles, and the construction duration lengthened to 32 months	Similar to Rehabilitation Alternative except impact area expanded to adjacent new alignment and the duration of the construction activities 33 months	Very similar to Bascule Bridge Alternative except duration 20 months	Very similar to Bascule Bridge Alternative except duration 24 months
Pier Displacement	No pier displacement of habitat	Same pier displacement of habitat as existing bridge	Increased pier displacement of habitat	Reduced pier displacement of habitat	Reduced pier displacement of habitat
Overall Habitat Quality	Substantially improved habitat quality due to site restoration, newly created habitat, removal of creosote-treated timbers and piles, and no displacement of in-water habitat	Somewhat improved habitat quality due to site restoration, newly created habitat, and use of non-toxic materials for new pilings and fenders	Similar to Rehabilitation Alternative except more deteriorated habitat quality due to displacement of previously undisturbed habitat on new alignment and increased displacement area over existing conditions	Similar to Rehabilitation Alternative except overall improved habitat quality considering substantially reduced displacement by in-water piers	Same as Mid-Level Fixed-span Bridge Alternative

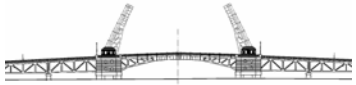

Table S-4. Comparison of Impacts by Alternative (continued)

Alternative	No Action	Rehabilitation	Bascule Bridge	Mid-Level Fixed-Span Bridge	High-Level Fixed-Span Bridge
Geology and Soils					
Construction Impacts	Temporary erosion and sedimentation from demolition New fill could cause settlement, affecting utilities and structures Mud could be tracked onto public roads	Similar to No Action Alternative plus pile driving for the temporary construction of new staging docks would result in vibration	Similar to Rehabilitation Alternative plus new right of way work area would be cleared, grubbed, and topsoil stockpiled	Same as the Bascule Bridge Alternative	Same as the Bascule Bridge Alternative
Hazardous Materials					
Construction Impacts	Contaminated soil, groundwater, and sediment could be encountered during demolition Workers could be exposed to hazardous materials from 2 sites Area of risk would be very modest in size	Contaminated soil, groundwater, and sediment could be encountered during demolition Workers could encounter underground storage tanks, asbestos, and lead-based paints during building demolition Workers could be exposed to hazardous materials from 9 sites Area of risk would be very moderate in size	Similar to Rehabilitation Alternative except workers could be exposed to hazardous materials from 11 sites and area of risk would be modest in size	Similar to Rehabilitation Alternative except workers could be exposed to hazardous materials from 13 sites and area of risk would be substantial in size	Similar to Rehabilitation Alternative except workers could be exposed to hazardous materials from 15 sites and area of risk would be substantial in size

APPENDIX A

Proposed Construction Impact Areas

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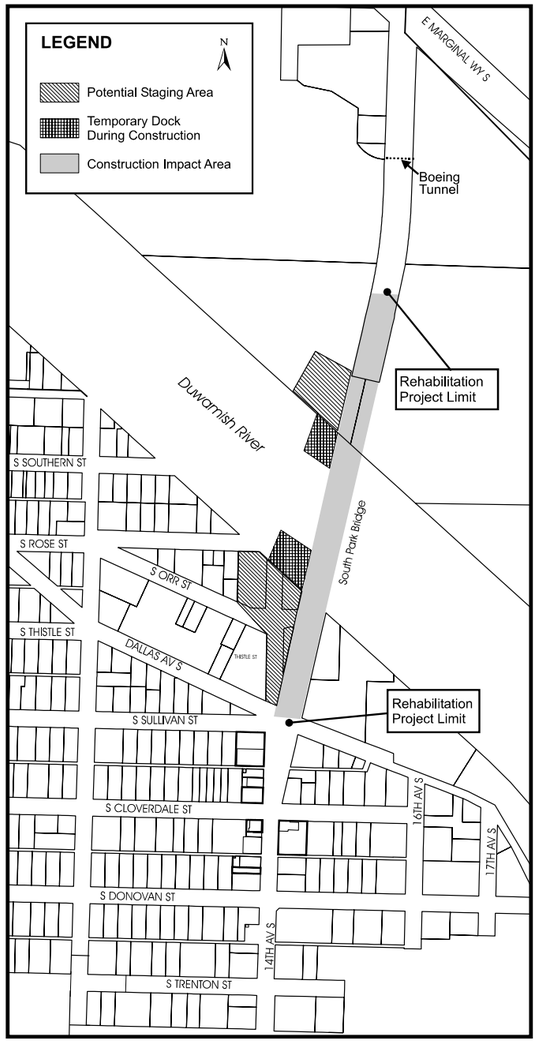
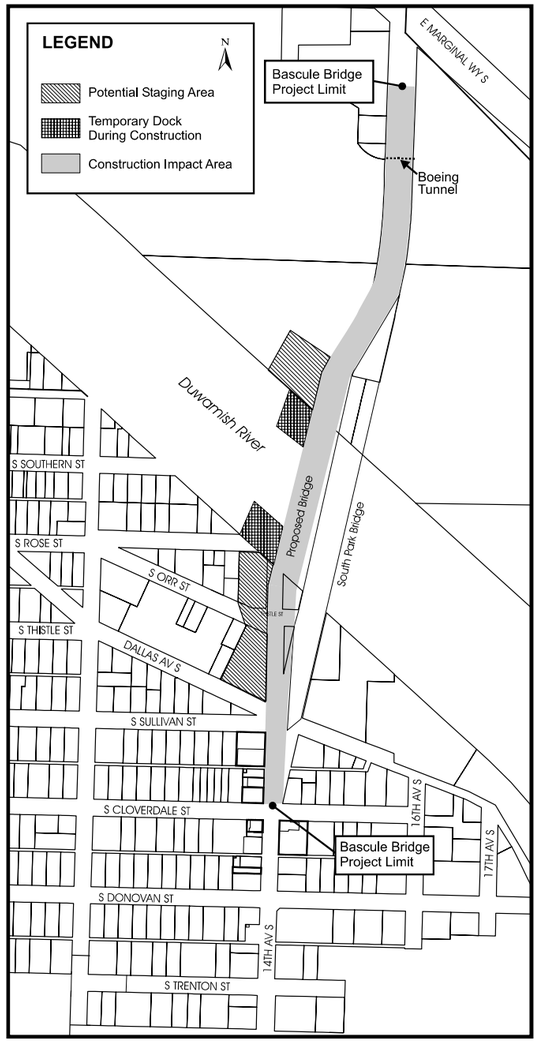
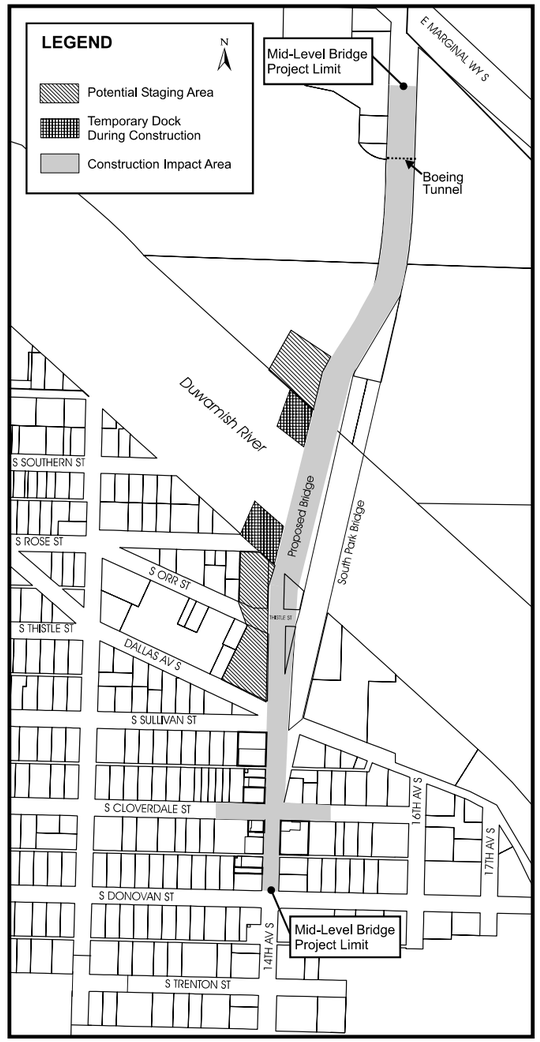


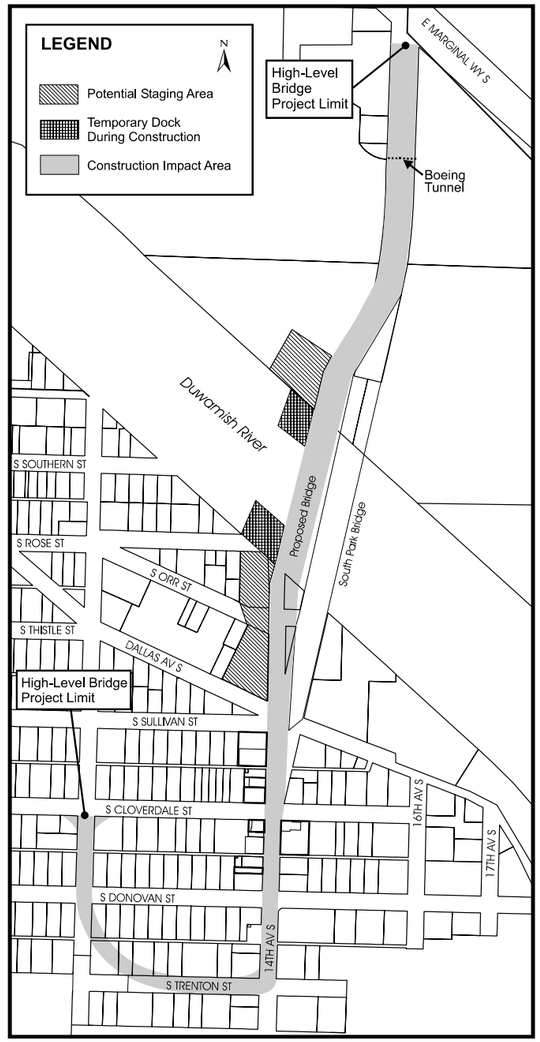
Rehabilitation Alternative



Bascule Bridge Alternative

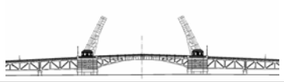


Mid-Level Fixed-Span Bridge Alternative



High-Level Fixed-Span Bridge Alternative

Appendix A
Proposed Construction Impact Areas



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